
Circulation Research

AN OFFICIAL JOURNAL OF THE AMERICAN HEART ASSOCIATION

VOLUME XIII

**July-December
1963**

Editor

EUGENE M. LANDIS, M.D., PH.D.

Associate Editors

A. CLIFFORD BARGER, M.D.

JOHN R. PAPPENHEIMER, PH.D.

AMERICAN HEART ASSOCIATION, INC.

Circulation Research

An Official Journal of the American Heart Association

Editorial Board

BENJAMIN ALEXANDER, M.D., *Boston, Massachusetts*
DOMINGO M. AVIADO, M.D., *Philadelphia, Pennsylvania*
ROBERT W. BERLINER, M.D., *Bethesda, Maryland*
ROBERT M. BERNE, M.D., *Cleveland, Ohio*
DAVID F. BOHR, M.D., *Ann Arbor, Michigan*
JULIUS H. COMROE, JR., M.D., *San Francisco, California*
PAUL F. CRANEFIELD, PH.D., *New York, New York*
GUSTAVE J. DAMMIN, M.D., *Boston, Massachusetts*
JAMES O. DAVIS, PH.D., M.D., *Bethesda, Maryland*
LEWIS DEXTER, M.D., *Boston, Massachusetts*
VINCENT P. DOLE, M.D., *New York, New York*
ALFRED E. FARAH, M.D., *Syracuse, New York*
ALFRED P. FISHMAN, M.D., *New York, New York*
JOHN H. GIBBON, JR., M.D., *Philadelphia, Pennsylvania*
R. GORDON GOULD, PH.D., *Palo Alto, California*
HAROLD D. GREEN, M.D., D.SC., *Winston-Salem, North Carolina*
FRED S. GRODINS, PH.D., M.D., *Chicago, Illinois*
ARTHUR C. GUYTON, M.D., *Jackson, Mississippi*

WILLIAM F. HAMILTON, PH.D., *Augusta, Georgia*
STEWART C. HARVEY, PH.D., *Salt Lake City, Utah*
DAVID MARK HEGSTED, PH.D., *Boston, Massachusetts*
ALRICK B. HERTZMAN, PH.D., *St. Louis, Missouri*
HEBBEL E. HOFF, PH.D., M.D., *Houston, Texas*
BRIAN F. HOFFMAN, M.D., *New York, New York*
LOUIS N. KATZ, M.D., *Chicago, Illinois*
W. F. H. M. MOMMAERTS, PH.D., *Los Angeles, California*
ELLIOT V. NEWMAN, M.D., *Nashville, Tennessee*
ROBERT E. OLSON, PH.D., M.D., *Pittsburgh, Pennsylvania*
J. LOWELL ORBISON, M.D., *Rochester, New York*
LYSLE H. PETERSON, M.D., *Philadelphia, Pennsylvania*
EUGENE M. RENKIN, PH.D., *Durham, North Carolina*
STANLEY J. SARNOFF, M.D., *Bethesda, Maryland*
WALTER H. SEEGER, PH.D., *Detroit, Michigan*
CHARLES W. SHEPPARD, PH.D., *Memphis, Tennessee*
KENNETH L. ZIERLER, M.D., *Baltimore, Maryland*
DON B. ZILVERSMIT, PH.D., *Memphis, Tennessee*

Consultant Editor

CARL F. SCHMIDT, M.D., Sc.D., *Philadelphia, Pennsylvania*

Circulation Research provides a medium for bringing together basic research on the cardiovascular system from various disciplines. The main research areas include biology, biochemistry, biophysics, morphology, pathology, physiology, and pharmacology. The Journal will also accept for publication manuscripts on clinical research that contribute to an understanding of fundamental problems.

PUBLICATION OF THIS JOURNAL IS SUPPORTED IN PART BY A GRANT FROM THE FANNIE E. RIPPEL FOUNDATION OF NEWARK, NEW JERSEY.

Publications Committee, American Heart Association

CHARLES A. R. CONNOR, M.D., *Chairman*

WRIGHT R. ADAMS, M.D.

SIMS GAYNOR

HANS H. HECHT, M.D.

KURT HIRSCHHORN, M.D.

RALPH E. KNUTTI, M.D.

PAUL H. LAVIETES, M.D.

PAUL MONTGOMERY

W. HENRY RUSSELL, M.D.

GEORGE E. WAKERLIN, M.D., PH.D., *Medical Director, American Heart Association*

E. COWLES ANDRUS, M.D.

HERRMAN L. BLUMGART, M.D.

EUGENE M. LANDIS, M.D., PH.D.

Circulation Research

AN OFFICIAL JOURNAL OF THE AMERICAN HEART ASSOCIATION

Volume XIII

July-December

1963

No. 1

Carl John Wiggers, M.D. (1883-1963) A Memorial Tribute.....	1
Pulsatile Pressure and Flow Through Distensible Vessels. Victor L. Streeter, W. Ford Keitzer, and David F. Bohr.....	3
Cardiac Arrhythmias Following Condenser Discharges and Their Dependence Upon Strength of Current and Phase of Cardiac Cycle. Bohumil Peleška.....	21
Response of the Heart to Increased Peripheral Resistance. A. Darwin de Mattos, Matthew N. Levy, and Harrison Zieske, Jr.....	33
Effects of Increased Transmural Pressures upon Atrial and Ventricular Rhythms in the Dog Heart-Lung Preparation. Robert L. Vick.....	39
Non-Newtonian Rheology of Human Blood: Effect of Fibrinogen Deduced by "Subtraction." Edward W. Merrill, Giles C. Cokelet, Anthony Britten, and Roe E. Wells, Jr.	48
Effects of Intra-arterial and Intravenous Epinephrine on Disappearance of NaI ¹³¹ from Calf Muscle and on Calf Blood Flow. Jay D. Coffman.....	56
Influence of Respiratory Acidosis on Circulatory Effect of Epinephrine in Dogs. Henrik H. Bendixen, Myron B. Laver, and Werner E. Flaeke.....	64
Gaseous Diffusion from Alveoli to Pulmonary Vessels of Considerable Size. Bruce J. Sobol, Georges Bottex, Cemil Emirgil, and Harold Gissen.....	71
Measurement of Cardiac Output Using the Photoelectric Earpiece: A Comparison with Simultaneous Fick Measurements. Arthur O. Phinney, Jr., W. Page C. Clason, Peter V. Stoughton, and Charles E. McLean.....	80
News from the American Heart Association.....	86
Contributors to this Issue	89

No. 2

Left Ventricular Tension and Stress in Man. Harold Sandler and Harold T. Dodge	91
Effect of Hemorrhagic Shock on the Reactivity of Resistance and Capacitance Vessels and on Capillary Filtration Transfer in Cat Skeletal Muscle. Stefan Mellander and David H. Lewis.....	105
Induced Changes in the Pattern of Pulmonary Blood Flow in the Rabbit. David E. Lehr, Martin A. Tuller, Lloyd C. Fisher, Kent Ellis, and Alfred P. Fishman	119
An Analysis of Arrhythmias Induced by Ouabain in Intact Dogs. Mario Vassalle, Kalman Greenspan, and Brian F. Hoffman.....	132

iii

Influence of Reserpine and βTM 10 on Digitalis-Induced Ventricular Arrhythmia. Jay Roberts, Ryuta Ito, Joseph Reilly, and Vincent J. Cairolì.....	149
Myocardial Necrosis in Rats: Serum Enzymes, Adrenal Steroid and Histopathological Alterations. Bernard C. Wexler and George W. Kittinger.....	159
Myocardial Blood Flow and Oxygen Uptake During Acute Red Cell Volume Increments. Timothy J. Regan, Martin J. Frank, Patrick H. Lehan, James G. Galante, and Harper K. Hellems.....	172
News from the American Heart Association.....	182
Contributors to this Issue.....	185

No. 3

Actin from Heart Muscle: Isolation, Purification and Physicochemical Properties. Arnold M. Katz and Elizabeth J. Hall.....	187
Effect of Epinephrine on the Mechanical and Phosphorylase Activity of Normo- and Hypothermic Hearts. Winifred G. Nayler and Juliet E. Wright.....	199
Effect of Experimental Congestive Heart Failure and Acetyl Strophanthidin on Myocardial Electrolyte and Water Content. Harry A. Bliss and Robert J. Adolph	207
Influence of Temperature on Development of Rigor Mortis in Dog Hearts. Hansjoerg Kolder, Alan D. Horres, and Gerhard A. Brecher.....	218
Sodium, Potassium, and Peripheral Resistance in the Rat Tail. Sydney M. Friedman, Miyoshi Nakashima, and Constance L. Friedman.....	223
Renal Effects of Angiotensin II Infusions in Normotensive Pregnant and Non-pregnant Women. Leon C. Chesley, Ralph M. Wynn, and Neil I. Silverman..	232
Effect of Angiotensin II on the Intact Forearm Veins of Man. Nicholas P. De Pasquale and George E. Burch.....	239
Group Isolation and Atherosclerosis in Cholesterol-Fed Cockerels. Ruth Piek, Louis N. Katz, Dolores Century, and Philip J. Johnson.....	246
Thromboplastic and Fibrinolytic Activities in Vessels of Animals. Tage Astrup and Karol Buluk	253
Hemodynamic Variables Affecting the Relation Between Mean Left Atrial and Left Ventricular End-Diastolic Pressures. Andrew G. Wallace, Jere H. Mitchell, N. Sheldon Skinner, Jr., and Stanley J. Sarnoff.....	261
News from the American Heart Association.....	271
Contributors to this Issue.....	276

No. 4

Potassium Exchange in the Dog Heart in Situ. Gunter Grupp.....	279
Intrarenal Distribution of Nutrient Blood Flow Determined with Krypton⁸⁵ in the Unanesthetized Dog. Geoffrey D. Thorburn, Hugh H. Kopald, J. Alan Herd, Milton Hollenberg, Charles C. C. O'Morehove, and A. Clifford Barger.....	290
Functional Properties of the Atrioventricular Conduction System. Brian F. Hoffman, E. Neil Moore, Jackson H. Stuckey, and Paul F. Cranefield.....	308

Effect of the Endecapeptide Eledoisin on the Coronary Blood Flow: Comparison with Nitroglycerin, Bradykinin and Epinephrine in the Dog. Mario Bergamaschi and Alfredo H. Glässer.....	329
Angiotensin in Blood and Lymph Following Reduction in Renal Arterial Perfusion Pressure in Dogs. Sanford L. Skinner, James W. McCubbin, and Irvine H. Page	336
Effect of Potassium on the Resting Length of Vascular Smooth Muscle of the Rabbit Aorta and its Response to l-Norepinephrine. John A. Bevan and J. V. Osher	346
Damping of Sound on the Chest Surface. J. Job Faber.....	352
Sustained Depressor Effect of Renal Medullary Extract in the Normotensive Rat. James B. Lee, Roger B. Hickler, Calvin A. Saravis, and George W. Thorn.....	359
News from the American Heart Association.....	367
Contributors to this Issue.....	371

No. 5

Body Surface Potential Distribution: Comparison of Naturally and Artificially Produced Signals as Analyzed by Digital Computer. Leo G. Horan, Nancy C. Flowers, and Daniel A. Brody	373
Antagonistic Effects on the Sinus Node of Acetylcholinesterase and Adrenergic Stimulation. Reginald A. Nadeau and Thomas N. James.....	388
Aggregation of Blood Cells by 5-Hydroxytryptamine (Serotonin). Roy L. Swank, J. H. Fellman, and W. W. Hissen.....	392
Histochemical Studies of Human Coronary Atherogenesis: Comparison with Aortic and Cerebral Atherogenesis. Frederick T. Zugibe.....	401
Cardiac Performance During Exercise in Dogs with Constricted Pulmonary Artery. G. C. Rastelli, Franz J. Hallermann, James L. Fellows, and H. J. C. Swan....	410
Cardiac Necrosis Accompanying Potassium Deficiency and Administration of Corticosteroids. Virginia L. Tucker, Hugh Hanna, Carolyn J. Kaiser, and Daniel C. Darrow	420
Effect of Epsilonaminocaproic Acid on the Turnover of Labelled Fibrinogen in Rabbits. Jerzy Gajewski and Benjamin Alexander.....	432
Effects of Carbon Dioxide on Cerebral Hemodynamics in Normal Subjects and in Cerebrovascular Disease Studied by Carotid Injection of Radioalbumin. Cesare Fieschi, Alessandro Agnoli, and Elda Galbo.....	436
Studies on Cardiac Dimensions in Intact, Unanesthetized Man. Part I. Description of Techniques and Their Validation. Donald C. Harrison, Allan Goldblatt, and Eugene Braunwald. Part II. Effects of Respiration. Allan Goldblatt, Donald C. Harrison, Gerald Glick, and Eugene Braunwald. Part III. Effects of Muscular Exercise. Eugene Braunwald, Allan Goldblatt, Donald C. Harrison, and Dean T. Mason.....	448
Effects of Hydralazine and High Molecular Weight Dextran upon the Circulatory Responses to Severe Thermal Burns. David D. Michie, Ralph S. Goldsmith, and Arthur D. Mason, Jr.....	468
Actin from Heart Muscle: Studies on Amino Acid Composition. Arnold M. Katz and Mary E. Carsten.....	474

Studies on Ductus Arteriosus Circulation. N. S. Assali, John A. Morris, Ronald W. Smith, and William A. Manson.....	478
Books Received	490
News from the American Heart Association	491
Contributors to this Issue	494

No. 6

SPECIAL SERIES: Myocardial Oxygen Consumption.

Donald E. Gregg, Guest Editor

✓ Editorial: Effect of Coronary Perfusion Pressure on Coronary Flow on Oxygen Usage of the Myocardium. Donald E. Gregg.....	497
Effect of Alterations of Coronary Blood Flow on the Oxygen Consumption of the Nonworking Heart. Richard L. Kahler, Eugene Braunwald, Leslie L. Kelminson, Laurence Kedes, Charles A. Chidsey, and Stanton Segal.....	501
✓ Effect of Alterations of Coronary Blood Flow on the Oxygen Consumption of the Working Heart. John Ross, Jr., Francis Kloeke, Gerard Kaiser, and Eugene Braunwald	510
✓ Relation Between Coronary Blood Flow and Myocardial Oxygen Consumption. S. J. Sarnoff, J. P. Gilmore, N. S. Skinner, Jr., A. G. Wallace, and J. H. Mitchell	514
✓ Influence of Coronary Flow upon Oxygen Consumption and Cardiac Performance. Howard Weisberg, Louis N. Katz, and Eugene Boyd.....	522
Blood Coagulation Changes in Rats Fed High Fat Diets. Lyman M. Fisher, Eugene Kagan, and Henry G. Kupfer.....	529
An Experimental Study of the Production and Time Course of Poststenotic Dilatation in the Femoral and Carotid Arteries of Adult Dogs. Margot R. Roach	537
Vasopressor Material in Experimental Renal Hypertension. Simon Koletsky and Walter H. Pritchard.....	552
Experimental Pulmonary Arterial Hypertension in the Newborn Calf. John H. K. Vogel, Keith H. Averill, Peter E. Pool, and S. Gilbert Blount, Jr.....	557
Congenital Heart Disease and Other Malformations Produced by Influenza A Virus and Allantoic Fluid in the Chick Embryo. Maria V. de la Cruz, Carlos Campillo-Sainz, Simón Muñoz-Armas, Asunción Pascual-Chávez, and Rafaela Zamudio-Bandera	572
Changes of Boundary Layer Flow in Model Systems: Implications for Initiation of Endothelial Injury. Heinz Scharfstein, William H. Gutstein, and Leon Lewis	580
Pressure Transients Occurring in Diastole in the Central Aorta. Thomas E. Piemme and Lewis Dexter.....	585
News from the American Heart Association	595
Contributors to this Issue	599
Volume Author Index	601
Volume Subject Index	603

Circulation Research

An Official Journal of the American Heart Association

Editorial Board

BENJAMIN ALEXANDER, M.D., *Boston, Massachusetts*

DOMINGO M. AVIADO, M.D., *Philadelphia, Pennsylvania*

ROBERT W. BERLINER, M.D., *Bethesda, Maryland*

ROBERT M. BERNE, M.D., *Cleveland, Ohio*

DAVID F. BOHR, M.D., *Ann Arbor, Michigan*

JULIUS H. COMROE, JR., M.D., *San Francisco, California*

PAUL F. CRANEFIELD, PH.D., *New York, New York*

GUSTAVE J. DAMMIN, M.D., *Boston, Massachusetts*

JAMES O. DAVIS, PH.D., M.D., *Bethesda, Maryland*

LEWIS DEXTER, M.D., *Boston, Massachusetts*

VINCENT P. DOLE, M.D., *New York, New York*

ALFRED E. FARAH, M.D., *Syracuse, New York*

ALFRED P. FISHMAN, M.D., *New York, New York*

JOHN H. GIBBON, JR., M.D., *Philadelphia, Pennsylvania*

R. GORDON GOULD, PH.D., *Palo Alto, California*

HAROLD D. GREEN, M.D., D.Sc., *Winston-Salem, North Carolina*

FRED S. GRODINS, PH.D., M.D., *Chicago, Illinois*

ARTHUR C. GUYTON, M.D., *Jackson, Mississippi*

WILLIAM F. HAMILTON, PH.D., *Augusta, Georgia*

STEWART C. HARVEY, PH.D., *Salt Lake City, Utah*

DAVID MARK HEGSTED, PH.D., *Boston, Massachusetts*

ALRICK B. HERTZMAN, PH.D., *St. Louis, Missouri*

HEBBEL E. HOFF, PH.D., M.D., *Houston, Texas*

BRIAN F. HOFFMAN, M.D., *New York, New York*

LOUIS N. KATZ, M.D., *Chicago, Illinois*

W. F. H. M. MOMMAERTS, PH.D., *Los Angeles, California*

ELLIOT V. NEWMAN, M.D., *Nashville, Tennessee*

ROBERT E. OLSON, PH.D., M.D., *Pittsburgh, Pennsylvania*

J. LOWELL ORRISON, M.D., *Rochester, New York*

LYSLE H. PETERSON, M.D., *Philadelphia, Pennsylvania*

EUGENE M. RENKIN, PH.D., *Washington, D. C.*

STANLEY J. SARNOFF, M.D., *Bethesda, Maryland*

WALTER H. SEEGER, PH.D., *Detroit, Michigan*

CHARLES W. SHEPPARD, PH.D., *Memphis, Tennessee*

KENNETH L. ZIERLER, M.D., *Baltimore, Maryland*

DON B. ZILVERSMIT, PH.D., *Memphis, Tennessee*

Consultant Editor

CARL F. SCHMIDT, M.D., Sc.D., *Philadelphia, Pennsylvania*

Circulation Research provides a medium for bringing together basic research on the cardiovascular system from various disciplines. The main research areas include biology, biochemistry, biophysics, morphology, pathology, physiology, and pharmacology. The Journal will also accept for publication manuscripts on clinical research that contribute to an understanding of fundamental problems.

PUBLICATION OF THIS JOURNAL IS SUPPORTED IN PART BY A GRANT FROM THE FANNIE E. RIPPEL FOUNDATION OF NEWARK, NEW JERSEY.

Publications Committee, American Heart Association

CHARLES A. R. CONNOR, M.D., *Chairman*

WRIGHT R. ADAMS, M.D.

SIMS GAYNOR

HANS H. HECHT, M.D.

KURT HIRSCHHORN, M.D.

RALPH E. KNUTTI, M.D.

PAUL H. LAVIETES, M.D.

PAUL MONTGOMERY

W. HENRY RUSSELL, M.D.

GEORGE E. WAKERLIN, M.D., PH.D., *Medical Director, American Heart Association*

E. COWLES ANDREWS, M.D.

HERRMAN L. BLUMGART, M.D.

EUGENE M. LANDIS, M.D., PH.D.

